LAC + USC BURN CENTER PHARMACOTHERAPY

Burn injury induces many different pathological changes in the human body, which can potentially affect pharmacodynamic and pharmacokinetic parameters such as volume of distribution and clearance. Volume of distribution (Vd) may change as a consequence of altered protein binding or an increased extracellular fluid volume. Alterations in clearance may be due to changes in hepatic blood flow, drug metabolizing activity, glomerular filtration, tubular filtration, protein binding and the presence of additional elimination.

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Kits available:

1. Cyanide Toxicity Antidote (Cyanokit)

Alcohol Withdrawal Treatment

Low risk & high risk patients with mild withdrawal sx.--may not require pharmacologic treatment, monitor
High Risk Patients-Moderate to Severe Withdrawal
Benzodiazepines (Grade A Recommendation):
Moderate withdrawal sx: Ward
Lorazepam: PO: 1-2 mg q6-8h; IV: 1-2 mg q2-4h as needed for withdrawal symptoms
Diazepam: 5-10 mg po q6-8h prn withdrawal sx
Severe withdrawal sx.: ICU monitoring
Escalating benzodiazepine dosing as needed to control sx
Diazepam - IV: 10mg iv q15 min to a max of 100 mg
Lorazepam - IV: 2mg iv q15-20 min to a max of 20 mg
Around the clock dosing as needed (Ativan iv gtt)
Monitoring Parameters/Comments
Monitor respiratory, cardiovascular, mental status, fall risk and orthostasis (monitor HR, BP; ECG if indicated)

QUICK REFERENCE GUIDE

(Please refer to the original protocol for full details http://dhs.lacounty.gov)

Antibiotic Protocol for Burn Unit

Based on culture and sensitivity patterns in the Burn Unit. Quinolones (e.g. Levofloxacin) are **not** to be used without prior approval of the burn attending staff. Burn Attending can also approve Tigecycline and Meropenem for MDR microorganisms; and Linezolid or Daptomycin for MRSA/ORSA if vancomycin MIC≥2.

I. Presumed sepsis in ICU patients:
Zosyn* + Tobramycin
- Add vancomycin for indications of previous ORSA or gram + micro-organisms on gram stain

II. Presumed sepsis in ward patients:
- Zosyn*

III. Burn wound cellulitis (non-critically ill):
Oxacillin IVPB or Dicloxacillin** PO**
Burn wound cellulitis (diabetic non-critically ill):
- **Cefoxitin* IVPB or Augmentin* PO**

Burn wound cellulitis (Critically ill):
- **Zosyn*± Vancomycin**

IV. For penicillin allergic patients:
* Use Aztreonam + clindamycin or vancomycin
** use Clindamycin

V. On Call Antibiotics:
ICU:
Zosyn ± Fluconazole
- Aztreonam + Clindamycin ± Fluconazole in Penicillin allergic patient

Ward:
Oxacillin (Clindamycin in penicillin allergic patient)
Cefoxitin if patient diabetic (Aztreonam + Clindamycin in Penicillin allergic patient)

VI. Inhalation Antibiotic – for pneumonia with persistent (+) sputum cultures after systemic antibiotic therapy:
TOBI (Tobramycin inhalation solution) ETT lavage

Ascorbic Acid

Indication: Pts with >30% TBSA burn, > 16 yrs old, thermal injury w/in 2 hrs before admission
Dose: 66 mg/kg/hr IV for first 24 hrs post-burn
Monitoring Parameters/Comments: Exclude pts with preexisting hepatic, respiratory, cardiac or renal dysfunction and coagulopathy.
Alert: Do not use POC testing of BG during & up to 36hrs post infusion

Colistimethate (IV)

Indication: Multi-drug resistant gram-negative infections.
Only with ID approval and follow up
Dose: Per Infectious Disease (I/D), pharmacy
Monitoring Parameters/Comments **Need ID approval before use.* Renal function (nephrotoxic); signs & symptoms of neurotoxicity.

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Endotracheal Antibiotic (ETT lavage)

Tobramycin (TOBI)

Indication: Intubated patients with documented pneumonia on chest x-ray and gram-negative organism in sputum culture
- unresponsive to appropriate systemic intravenous antibiotics
- pan-resistant gram-negative organism
- recurrent gram-negative pneumonia after previous successful course of systemic intravenous antibiotic

Dose: Adults: 300 mg ETT q12h; Peds: 2 mg/kg ETT q8h
Monitoring Parameters/Comments: Renal function; trough tobramycin level

Haloperidol

Indication: Agitation in ICU pts
Dose: Mild-moderate – 2 mg IV q6h; Mod-severe – 5 mg IV q6h **Attending approval required for dose >40mg per day*
Monitoring Parameters/Comments QTc interval before each dose given; extrapyramidal, hypotension
Prolonged QTc = male >450msec; female >470 msec

Heparin (Aerosolized)

Indication: Bronchoscopy confirmed inhalation injury in mechanically ventilated (HFPV) ICU pts ≥18 yrs old
Dose: 10,000 units neb Q4H x 7 days alternating with albuterol 2.5mg Q4H.
Monitoring Parameters/Comments: aPTT/INR/PT; sign/symptoms of bleeding – May consider use of Acetylcysteine (Mucomyst®) if detect casts due to mucus

Immune Globulin (IVIG)

Indication: Toxic Epidermal Necrolysis (TEN)
Dose: 1 gm/kg/day x 3 to 5 days depending on sx.
Monitoring Parameters/Comments: Anaphylaxis; renal function.*Refer to nursing administration/monitoring sheet*

Insulin Regular Continuous Infusion (Adult)

Indication: Hyperglycemia in *Burn ICU* only
****1 unit/ml concentration *only*.**
Dose: Burn Insulin drip subphase for initial bolus dose and continuous infusion rate. Adjust insulin dose using Nomogram as a guideline with double check procedure
Monitoring Parameters/Comments: Target BG levels: 100-150 mg/dL

Neostigmine

Indication: Ogilvie's Syndrome; see exclusion criteria
Dose: 2 mg IV over 3-5 minutes. If no response after 3-4 hrs, may give a second dose.
Monitoring Parameters/Comments: Vital signs; signs of n/v, excessive salivation, sweating, diarrhea, fluid status, electrolyte balance

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Neuromuscular Blocking Agents
****Avoid succinylcholine due to hyperkalemia**
* **For Pediatric pts – consult Pediatric Service whether to use TOF or other clinical assessments**

Vecuronium bromide
Indication: Neuromuscular Blocking agent for increased intra-abdominal pressure, facilitate mechanical ventilation, prevent self-injury.
Dose:
Loading dose: Peds & Adults: 0.08-0.1 mg/kg
Continuous Infusion: Infant-1yr old: 0.8-1.7mcg/kg/min; children >1 yr. old: 0.8-2.5mcg/kg/min
Adult: 0.8-1.2mcg/kg/min
Monitoring Parameters/Comments: Train of four (TOF) titration parameters. After 48 hrs of continuous infusion, needs daily drug dose evaluation.

Cisatracurium besylate
Indication: Neuromuscular Blocking agent for increased intra-abdominal pressure, facilitate mechanical ventilation, prevent self-injury.
Dose:
Loading dose: 1-23 Month: 0.15mg/kg; >=2yrs: 0.1-0.15mg/kg; adult: 0.1-0.2mg/kg
Continuous Infusion: Infants & children: 1-4mcg/kg/min; Adults: 1-3mcg/kg/min
Monitoring Parameters/Comments: Train of four (TOF) titration parameters. After 48 hrs of continuous infusion, needs daily drug dose evaluation.

Oxandrolone
Indication: Anabolic steroid used for pts with ≥20% TBSA burn; age >18 yrs and requires tube feeds
Dose: Initial: 2.5mg po BID and titrate to 10mg po BID (max)
Monitoring Parameters/Comments: LFTs (Discontinue if 3x ULN)

Pain Management Algorithm
Pediatric patients defined as age <17years AND weight <50kg. Consult pediatrics if pain management ineffective.

ICU
1. **Severe Pain (pain scale 7-10)**
   A. Background pain: IV drip Morphine ± Midazolam **OR** Fentanyl ± Midazolam (*Adults/Peds*)
   B. Procedural or Breakthrough pain: IVP Morphine or Fentanyl ± Midazolam or Lorazepam (*Adults/Peds*)

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ICU
2. **Moderate Pain (pain scale 4-6)**
   A. Background pain: Oral Hydromorphone or oral Morphine {MSContin if can swallow) around the clock ± Lorazepam *(Peds: Oral Morphine liquid ATC)*
   B. Procedural or Breakthrough pain: IVP Morphine ± Midazolam or Lorazepam *(Peds: oral morphine liquid)*

3. **Mild pain (pain scale 1-3)**
   A. Background pain: NSAIDS or plain Acetaminophen if not contraindicated (if insufficient Vicodin or Norco ATC). *(Peds: NSAIDS or plain acetaminophen, if insufficient can use Tylenol w. Codeine or Norco)*
   B. Procedural or Breakthrough pain: Norco or Vicodin *(Peds: Tylenol w. Codeine or Norco liq)*

*Avoid NSAIDS before surgery.
*Max. dose for acetaminophen is 4 grams per day for adults (Peds: Acetaminophen dosage max: 650mg/dose **and** 75 mg/kg/day orally or rectally up to 4 grams per day).

WARD
1. **Severe Pain (pain scale 7-10)**
   A. Background pain: Oral MSContin ± Lorazepam *(Peds: Oral Morphine liquid ATC)*
   B. Procedural or Breakthrough pain: IV Morphine or oral Morphine ± Lorazepam (*Adults/Peds*)

2. **Moderate Pain (pain scale 4-6)**
   A. Background pain: Norco around the clock (or MS contin if Norco insufficient) *(Peds: Tylenol w. Codeine ATC)*
   B. Procedural or Breakthrough pain: Norco ± Lorazepam *(Peds: Tylenol w. Codeine)*

3. **Mild pain (pain scale 1-3)**
   A. Background pain: Consider NSAIDS or plain Acetaminophen if not contraindicated (if insufficient Vicodin ATC). *Peds: NSAIDS or plain Tylenol, if insufficient can use Tylenol w. Codeine)*
   B. Procedural or Breakthrough pain: Norco or Vicodin. *(Peds: NSAIDS or plain Tylenol, if insufficient use Tylenol w. codeine)*

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Pediatric CPR Dosing and Cardiac Resuscitation Drugs
Refer to calculated dose for each pediatric patient based on their weight. Posted at bedside and copy placed inside each patient's chart.

Sedation Guidelines for ICU Adults
Adequate doses and careful titration of sedatives to obtain optimal level of comfort while keeping patient oriented and able to follow commands. Daily interruption of sedation and use of sedation scale (RASS) are used for routine assessment of cognitive function.

Midazolam (for sedation/anxiolytic)
IVP: 1- 5 mg q1-2h, ↓ dose for elderly
CIV: 1-4 mg/hr only for mechanically ventilated patients
*induces delirium/disinhibition, active metabolites

Lorazepam (for sedation/anxiolytic)
IVP: 1- 4 mg q2-6h
*induces delirium/disinhibtion, long half-life, IV form may cause propylene glycol toxicity

Clonidine (for drug/ETOH withdrawal)
PO: 0.1 – 0.3 mg q8h
*recommended for alcohol/drug withdrawal pts

Haloperidol (for ICU delirium)
IVP: 2-5 mg q6h [max: 40 mg/day]; *Hold for QTc > 450 msec for males and >470 msec for females

Dexmedetomidine - ICU sedation only during extubation weaning criteria with anticipated extubation within 24hrs
CIV: 0.2-0.7 mcg/kg/hr for max. 24 hours; no bolus recommended d/t hypotension, bradycardia, sinus arrest

Risperidone (for ICU delirium)
PO: 0.5-2 mg po q12h; *Hold for QTc > 450 msec for males and >470 msec for females. [max ICU delirium: 4mg/day]

Propofol (for procedures in mechanically intubated pts)
IVP: 20-50mg (0.5-1mg/kg)
↓ dose in elderly and hypovolemic patients
*may cause propofol infusion syndrome
**Continuous infusion MUST be approved by Burn Attending.

Note: Above protocols have been approved only as a guideline for burn patients in LAC+USC Burn Center. Recommendations are current only to the last update date at the bottom of each protocol.
Orig. TF & AB 08; Rev: AB & CH 09; Rev AB & SS 11; Rev: AB 12, 13 & 14; Rev: AB & SM 15 & 16;